

Application No. 10/811,932

Reply to Office Action of December 19, 2005

IN THE DRAWINGS

The attached sheets of drawings include changes to Figs. 1-6. These sheets, which include Figs. 1-6, replaces the original sheets including Figs. 1- 6.

Attachment: Replacement Sheets

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-34 and 39-55 are presently active; Claims 35-38 have been withdrawn from consideration by a Restriction Requirement. Claims 1, 18, 21, 22, 31, 32, and 39 have been amended by the present amendment.

In the outstanding Office Action, the drawings were objected to because of the informalities. Claims 1-55 were rejected under 35 U.S.C. § 101 as being non statutory. Claims 1-34 and 39-55 were rejected under 35 U.S.C. § 102(e) as anticipated by Pasadyn et al (U.S. Pap 2005/0221514, herein after referred to as Pasadyn).

Firstly, Applicants acknowledge with appreciation the courtesy of Examiner Desta and Supervisory Examiner Hoff to conduct an interview in this case on February 2, 2006. During the interview, the issues identified in the outstanding Office Action and particular embodiments of the present invention were discussed.

Secondly, regarding the drawings, replacement drawing sheets showing formally the changes requested in the Office Action are filed herewith. Thus, it is respectfully submitted that the objection to the drawings have been overcome.

Thirdly, regarding the 35 U.S.C. § 101 rejection, during the interview, Supervisory Hoff expressed a position that a decision on the claims satisfying the useful, concrete and tangible result test would be enhanced if the claims set forth a recitation of the improved process control. Hence, in an effort to expedite prosecution, the independent claims presently define that the methods, systems, and computer readable medium defined therein improve control of the process. Thus, it is respectfully requested that the 35 U.S.C. § 101 rejection be withdrawn.

Finally, regarding the rejection on the merits, the pending independent claims have been rewritten to clarify the present invention. During the interview, Applicants' representative pointed out specifically Figure 15 of Pasadyne and discussed how the present invention differed from that in Pasadyne. In particular, Applicants' representative pointed out that Pasadyne use model predictive control (MPC) or proportional-integral-derivative (PID) tuning to affect changes to the process control which, as implied in Figure 15 of Pasadyne, indicates a adjustments made on a single data point.

Specifically, Pasadyne discloses in numbered paragraphs [0049] and [0053] that:

[0049] In various illustrative embodiments, the adaptive sampling processing model may incorporate at least one model predictive control (MPC) controller, or at least one proportional-integral-derivative (PID) controller, having at least one tuning parameter. In various of these illustrative embodiments, the adaptive sampling processing model, appropriate for processing, may incorporate at least one closed-loop model predictive control (MPC) controller, or at least one closed-loop proportional-integral-derivative (PID) controller, having at least one tuning parameter. The model predictive control (MPC) controller or the proportional-integral-derivative (PID) controller tuning parameter(s) may be optimized based on an objective function that minimizes undesirable processing conditions in the processing performed on the workpiece 100 in the processing tool 105.

[0053] For example, a model predictive control (MPC) controller or a proportional-integral-derivative (PID) controller may be designed to generate an output that causes some corrective effort to be applied to the processing performed on the workpiece 100 in the processing tool 105 to drive one or more measurable processing tool variable and/or one or more processing parameter toward a respective desired value known as the setpoint. The model predictive control (MPC) controller or the proportional-integral-derivative (PID) controller may generate the output that causes the corrective effort by monitoring and/or measuring and/or observing the error between the setpoint and a measurement of the respective processing tool variable(s) and/or processing parameter(s).

These methods rely on feedback control signals to provide control, at any point in the process, to affect the process by changing the one or more processing parameters to drive the process back into compliance. However, as discussed during the interview, the cause of the

underlying non-compliance with the model-based control is not readily addressed in such setpoint-by-setpoint correction.

The present invention, as clarified, addresses this deficiency by:¹

- 1) measuring process control output data from the process in the semiconductor manufacturing system,
- 2) determining a functional relationship between the process control output data and the process control input data along a plurality of process control output data points,
- 3) setting target process control output data to a target result of the process, and
- 4) calculating new process control input data based on the target result by
 - a) producing predicted process control output data associated with the plurality of process control output data points by applying the functional relationship to the new process control input data, and
 - b) revising the new process control input data by minimizing an integrated difference between the target process control output data and the predicted process control output data to thereby improve control of the process.²

By determining a functional relationship between the process control output data and the process control input data along a plurality of process control output data points, Applicants submit that any inconsistencies between for example a model-based control and reality are better accommodated in the generation of new process control data, rather than the approach of Pasadyn which reacts to individual setpoint errors.

¹ Support for the clarifications are found in the original claim language which has been rearranged and at least in Applicants eqns. (4), (5a), and (6a) in which the model is characterized as a quadratic function and in which the subscript terms denote the evaluation of multiple data points in the model data, the target output process control data and the predicted process control output data.

² The enumerations used here are used solely for the purpose of labeling.

Examiner Desta indicated that the arguments and differences presented during the interview were reasonable, but no decision on patentability could be reached without further consideration of Pasadyn.

M.P.E.P. § 2131 states that to anticipate a claim, the reference must teach every element of the claim, and sets forth case law requiring for anticipation that:

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). ... “The identical invention must be shown in as complete detail as is contained in the ... claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). The elements must be arranged as required by the claim, but this is not an *ipsissimis verbis* test, i.e., identity of terminology is not required. *In re Bond*, 910 F.2d 831, 15 USPQ2d 1566 (Fed. Cir. 1990).

Applicants submit that this standard for anticipation is not met by Pasadyn.

Specifically, Pasadyn fails to disclose (or suggest) determining a functional relationship between the process control output data and the process control input data along a plurality of process control output data points. Moreover, Pasadyn fails to disclose (or suggest) calculating new process control input data based on the target result by (1) producing predicted process control output data associated with the plurality of process control output data points by applying the functional relationship to the new process control input data and (2) revising the new process control input data by minimizing an integrated difference between the target process control output data and the predicted process control output data to thereby improve control of the process.

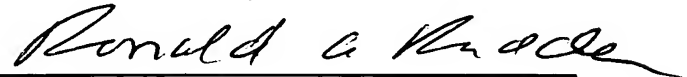
Thus, it is respectfully submitted that independent Claims 1, 18, 32, 35, 37, and 39 and the claims dependent therefrom patentably define over Pasadyn.

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Consequently, in view of the present amendment and in light of the above discussions, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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